

What is claimed is:

522 Rec'd PC-PTO 22 JAN 1999

1. A low stray interconnection inductance power
converting module for converting a DC voltage into an AC
5 voltage, comprising two DC voltage terminals for receiving
the DC voltage; an AC voltage terminal for delivering the
AC voltage; a half-bridge including a pair of power
switching elements connected as a series totem pole
between the DC voltage terminals via the AC voltage
10 terminal; and a decoupling means for decoupling the half-
bridge, the decoupling means comprising a series of at
least two adjacent superimposed electrode plates separated
by a dielectric material, each of the adjacent electrode
plates being connected to a different one of the DC
15 terminals, the low stray interconnection inductance power
converting module being characterized in that:

the at least two adjacent superimposed electrodes
plates extend proximately in overlapping relation with the
half bridge; and

20 the electrode plates form with the two power
switching elements, the DC terminals and the AC terminal
a reduced cross section belt-like closed loop conductive
path.

25 2. A power converting module according to claim 1,
comprising a base made of ceramic material, onto which the
power switching elements are mounted, and wherein:

each of the power switching elements includes a row
of power semiconductor devices mounted in parallel;

30 the AC terminal includes a central metal plate
mounted on the base; and

each of the two DC voltage terminals includes a
lateral metal plate mounted onto the base, and a lateral
upright metal wall connected between the lateral metal
35 plate and the decoupling means, the power switching
elements being connected as a series totem pole between

the lateral metal plates of the DC voltage terminals via the central metal plate of the AC voltage terminal.

5 3. A power converting module according to claim 2, wherein the reduced cross section belt-like closed loop conductive path is formed by the central plate, the lateral metal plates, the lateral upright metal walls, the superimposed electrode plates and the power switching elements, and has a rectangular cross section.

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4. A power converting module according to claim 2 or 3, further comprising drivers mounted on the base nearby the power semiconductor devices, for driving the power semiconductor devices.

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5. A power converting module according to claim 4, wherein said semiconductor devices are gate capacitance controlled semiconductor devices, and wherein each of the drivers includes:

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a terminal to receive a gate signal for the corresponding semiconductor device;

a first resistor connected between the terminal and a gate of the corresponding semiconductor device;

25 a circuit segment including a voltage gate controlled switch and a second resistor connected in series, the circuit being connected in parallel to the first resistor;

30 a capacitor connected between a gate of the voltage gate controlled switch and the collector of the corresponding semiconductor device for monitoring collector voltage signal of the corresponding semiconductor device;

35 a voltage clamping mean connected between the gate of the voltage gate controlled switch and the terminal, whereby, in operation, the first resistor limits gate current of the corresponding semiconductor device prior to a drop of the collector voltage signal thereby limiting

rise time of the collector current, and whereby, in operation, the first and second resistors limit the gate current of the corresponding semiconductor device during said drop of the collector voltage thereby limiting dropping time of collector voltage.

6. A power converting module according to claim 2, 3, 4 or 5, comprising a control board for controlling the power semiconductor devices, the control board being located between the base onto which the power switching elements are mounted and the decoupling means.

7. A power converting module according to claim 1, 2, 3, 4, 5 or 6, further comprising walls made of conductive material for closing open ends of the belt-like closed loop conductive path, each of the open ends being delimited by edges of the central plate, of the lateral metal plates and of the lateral metal walls and by a lower edge of the superimposed metal plates whereby, in operation, an electric current is magnetically induced into the conductive walls to further reduce voltage spikes associated to stray interconnection inductance.

8. A power converting module according to claim 1, 2, 3, 4, 5 or 6, further comprising a housing including conductive walls surrounding the reduced cross section belt-like closed loop conductive path, whereby, in operation, an electric current is magnetically induced into the conductive walls to further reduce voltage spikes associated to stray interconnection inductance.

9. A power converting module according to claim 8, wherein at least one of the conductive walls of the housing are formed by a metal deposition over insulating walls.

10. A power converting module according to claim 8 or 9, wherein the conductive walls of the housing are made of at least two parts connected together.

5 11. A power converting module according to claim 8, 9 or 10, further comprising a capacitor connected between the conductive walls of the housing and one of the DC terminals, the conductive walls providing one connecting point for electrical connection purpose.

10 12. A power converting module according to claim 11, wherein the capacitor is formed by a wall of the conductive walls that is adjacent to a top electrode plate of the decoupling means, and that is separated from the
15 top electrode plate by means of dielectric material.

13. The combination of three power converting modules according to claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 or 12, in a motor wheel provided with a stator frame
20 supported by a cross member made of conductive material, wherein the three modules are mounted respectively on three legs of the cross member within the motor wheel, the modules forming a three-phase power converter which further comprises:

25 a first conductive bus connecting one of the DC terminals of each module on one side of the cross member; and

30 a second conductive bus connecting the other of the DC terminals of each module on the other side of the cross member, the two conductive bus delimiting spaces between adjacent modules that are filled with the conductive material of the cross member, the two conductive bus and the cross member being separated by insulating material, whereby, in operation, an electric current is magnetically
35 induced in the cross member to suppress the voltage oscillations on the capacitor of each module due to the

stray interconnection inductance present between the modules.

14. A method for converting a DC voltage into an AC
5 voltage, comprising the steps of applying the DC voltage
on two DC voltage terminals between which a half-bridge is
connected, the half-bridge including a pair of power
switching elements connected as a series totem pole
10 between the DC voltage terminals via an AC voltage
terminal; alternately switching the power switching
elements; decoupling the half-bridge by means of a
decoupling means comprising a series of at least two
adjacent superimposed electrode plates separated by a
dielectric material, each of the adjacent electrode plates
15 being connected to a different one of the DC terminals;
and delivering the AC voltage by means of the AC voltage
terminal, the method being characterized in that the step
of decoupling comprises steps of:

extending the at least two adjacent superimposed
20 electrode plates proximately in overlapping relation with
the half bridge; and

forming a reduced cross section belt-like closed
loop conductive path with the electrode plates, the two
power switching elements, the DC terminals and the AC
25 terminal.

15. A method according to claim 14, comprising the
additional step of surrounding the reduced cross section
belt-like closed loop conductive path by means of a
30 housing including conductive walls, whereby, in operation,
an electric current is magnetically induced into the
conductive walls to further reduce voltage spikes
associated to stray interconnection inductance.